

## Design and Detection and Justified Analysis of the Bone Tumor using Different Techniques

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### Abstract

Picture handling have an immense zone under research, in which Medical Imaging is the most critical region to work in. As in natural cases, for example, breaks, tumors, ulcers, and so on picture preparing made it all the more simple to discover the precise reason and the best fitted arrangement. Explicitly in tumor identification medicinal imaging accomplished a benchmark by settling different complexities. Fundamentally Medical Imaging can be clarified as the way toward making human self-perceptions for therapeutic and research work. For tumor discovery different strategies, for example, MRI (Magnetic Resonance Imaging), CT (Computerised tomography) output and Microwave are accessible among referenced methods MRI conveys the best pictures as it has higher goals. In this paper the tumor recognition have been proposed utilizing AI.

**Keywords:** image processing, tumors, medical imaging, MRI, CT scan, machine learning.

### INTRODUCTION

Malignant growth is the most yielded illness everywhere throughout the globe. which is clinically alluded as a noxious neoplasm, it is a diverse hereditary infection that is caused essentially by the natural variables. As the best possible treatment isn't accessible a large portion of the patient get kicked the bucket however the quantity of passings can be decreased by methods for early location of malignant growth in order to continue for controlling techniques [1]. Liberated cell development is the side effect of malignant growth prompting structure the noxious tumors, which ambushes the adjacent body tissues. These tumors further develops and hinder the circulatory framework, apprehensive and stomach related framework and furthermore can free hormones that prompts change the correct body work [2]. The free cell development isn't really destructive except if and until it influence the DNA. On the off chance that the influenced DNA cannot be fixed inside the

early time it might prompt DNA to kick the bucket prompts creation of pointless new cells [3]. Disease regularly turned out to be extreme in ones case because of property of 'Metastatis'. The procedure of metastatis can be characterized as the procedure of development of malignant growth cells starting with one piece of the body then onto the next part prompting produce tumors that restore to normal tissue [4]. There are about 200 sorts of disease causing tumors. The essential manifestations of disease are the another knot, anomalous dying, a drawn out hack, unexplained weight reduction, change in solid discharge and so on. Essentially tumors are of two sorts harmful and non-dangerous, clinically can be named as threatening and amiable [5]. Amiable tumor can be evacuated by the medical procedure and at most it doesn't develop once more. As a rule threatening tumor can be recognized the tumor with bigger core contrasted and the ordinary cell cores. Clinically the bone malignant growth is

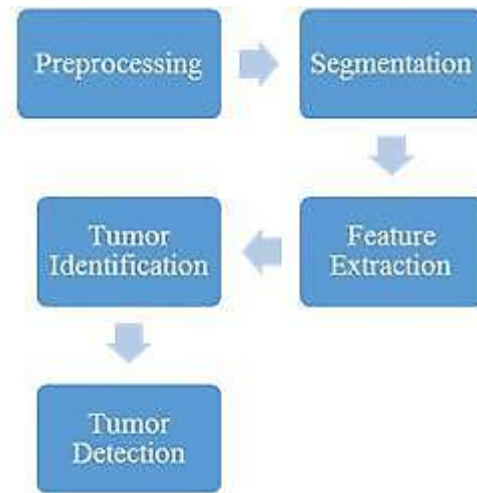
named as the Sarcomas, which starts in the muscle, bone, sinewy tissue, veins, a few tissues. The absolute most normal sorts of bone malignant growth are osteosarcoma, chondrosarcoma, ewings sarcoma, pleomorphic sarcoma, fibrosarcoma. In bone disease the tumor gets framed into the bone and influence the bone development, bone development. Explicitly in the bone tumor thought, Enchondroma is a sort of considerate tumor found inside the bone which starts at the ligament [6]. In a large portion of the cases Enchondroma found in the little bones of hand, conceivable defenseless bone territories for Enchondroma are the femur (thigh bone), tibia (shin bone), humerus (upper arm bone). Bone malignancy happened in four phases:

**Table 1:** Different stages of bone tumor

Stage 1	Only tumor detected and not spread out of the bone
Stage 2	In aggressive stage.
Stage 3	Tumor started growing in another Multiple places.
Stage4	Cancer has reached other parts of the body.

## METHODOLOGY

In this paper a technique is acquainted with distinguish bone malignant growth by utilizing AI calculation. The principle objective is to distinguish the tumor present in the bone, yet the vast majority of the occasions it happens that in techniques for tumor identification the pictures got thinks of the more noteworthy commotion factor which limit the zone to work as it doesn't give the careful area of tumor and the influenced tissues. Consequently in this paper a novel methodology have been proposed which will involved the quantity of stages which will at last lead to the best possible recognition of Enchondroma tumor for example bone tumor. A basic stream graph for the proposed framework as pursues:



**Figure 1:** Process flow chart

## Morphological Operation

Morphology is an expansive arrangement of picture preparing tasks that procedure pictures dependent on shapes. Morphological tasks apply an organizing component to an information picture, making a yield picture of a similar size. In a morphological task, the estimation of every pixel in the yield picture depends on an examination of the relating pixel in the information picture with its neighbours. By picking the size and state of the area, we can develop a morphological activity that is delicate to explicit shapes in the information picture. The most fundamental morphological activities are expansion and disintegration. Widening adds pixels to the limits of articles in a picture, while disintegration expels pixels on item limits. The quantity of pixels included or expelled from the articles in a picture relies upon the size and state of the organizing component used to process the picture. In the morphological enlargement and disintegration tasks, the condition of some random pixel in the yield picture is controlled by applying a standard to the relating pixel and its neighbours in the info picture. The standard used to process the pixels describes the movement as extending or breaking down. Discussed capable substance based helpful picture recuperation, good as demonstrated by the

Patterns for bleeding edge Database structures (PANDA) framework for instance depiction and the officials. Crumbling errand is used to backlash or take out little articles and heading used in MATLAB is pushed ahead. Extension assignment is used to expand territories and edges and the course used in MATLAB is quick

### A. Dilation

Expansion is one of the two essential administrators in the territory of numerical morphology, the other being disintegration. It is commonly connected to double pictures, yet there are adaptations that deal with dim scale pictures. The essential impact of the administrator on a paired picture is to step by step augment the limits of locales of closer view pixels (for example white pixels, regularly). In this manner, regions of frontal area pixels develop in size while openings inside those districts end up littler. The expansion administrator accepts two bits of information as data sources. The first is the picture which is to be enlarged. The second is a (typically little) arrangement of organize focuses known as an organizing component (otherwise called a piece). It is this organizing component that decides.

### B. Erosion

The estimation of the yield pixel is the base estimation of the considerable number of pixels in the information pixel's neighborhood. In a paired picture, if any of the pixels is set to 0, the yield pixel is set to 0. Pixels past the picture outskirt are relegated the greatest esteem managed by the information type. For twofold pictures, these pixels are thought to be set to 1. For dark scale pictures, the most extreme incentive for uint8 pictures is 255.

### C. Opening

Opening ids characterized as the disintegration pursued by the expansion

utilizing the equivalent organizing component for the both task. The opening administrator in this manner requires two info a picture to be opened and an organizing component. Dim dimension opening comprises just of dim dimension disintegration pursued by dark dimension widening. Opening is the double of shutting.

As most of the times the captured images are degraded with the noise leads to poor quality hence to extract exact and important information from the image preprocessing is very much important. Preprocessing is done by denoising the image. Main steps in preprocessing are:

- RGB to Grayscale Conversion
- Bilateral Filtering

The filtering operation can be mathematically formulated as follows:

$$I_b(x, y) = \frac{\sum_{n=-N}^N \sum_{m=-N}^N W(x, y, n, m) I_g(x - n, y - m)}{\sum_{n=-N}^N \sum_{m=-N}^N W(x, y, n, m)}$$

Where,

$I_g(x, y)$  is a grayscale image ranging values in the range [0,1].

$I_b(x, y)$  will be a bilateral filtered version of  $I_g(x, y)$  [1]

### Segmentation

Image segmentation is the process of dividing the image into the partitions on the basis of regions with similarities. In this paper the use of K-Means clustering algorithm and the Fuzzy C-Means algorithm have been proposed.

K-means Clustering algorithm:

Basically the clustering can be defined as the grouping pixels of an image such that pixels possessing similarities belongs to the same cluster.

Mathematically,

$$M = \frac{\sum I: c(i) = k \cdot x_i}{N_k}, k=1, 2, \dots, k$$

Where M is a specific cluster. [2]

Fuzzy C-Means Segmentation algorithm. Fuzzy stands for the probabilistic logic or a multi-values logic. In fuzzy C-means the main prime features are: support, boundary and the core. They are varied in the cluster membership as the support is non-membership value of the set whereas the boundary is the intermediate membership with value ranging from [0,1] and the core is fully member of the fuzzy set.

Fuzzy C-Means is the clustering algorithm which allows one piece of data to be the part of another cluster.

It is based on the reducing the following function:

$$J_m = \sum_{i=1}^n \sum_{j=1}^c u_{ij}^m \|x_i - C_j\|^2$$

$U_{ij}$  is the degree of membership of  $x_i$  in the cluster  $j$ ,  $x_i$  is the  $i$ th of  $d$ -dimensional measured data,  $C_j$  is the  $d$ -dimensional center of the cluster, and  $\|*\|$  is any norm expressing the similarity between any measured data and centre [2].

### Feature Extraction

The feature extraction from the captured images can be carried out with the number of techniques available. In this paper we are going to use the machine learning algorithm so as to make the system more robust. In machine learning algorithm there are several algorithms which are classified based on their performance. Specifically in supervised learning the Random forest and the nearest neighbor algorithm are worth useful, as these algorithms generates a function that maps inputs to desired outputs.

### Tumor Identification

The bone tumor is identified by simply calculating the mean pixel intensity of segmented image.

Mathematically, the mean pixel intensity can be calculated as:

$$\text{Mean pixel intensity} = \frac{\sum \text{intensities for extracted tumor part}(s)}{\text{No. of pixels for extracted tumor part}(N)}$$

### Tumor Detection

After the tumor identification process it is last step to detect the tumor which can be carried out by using the MATLAB function for connected components which will simply select out the area with maximum connected component and the remaining area will be discarded.

### CONCLUSION

In this paper we have considered the fundamental instrument for tumor identification. In this audit article we have explicitly centered around the bone tumor location. A calculation contained the different stages have been aggregated to ponder the outcome.

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